

On the Ecology of Przewalsky's Gecko (*Teratoscincus przewalskii*) in the Transaltai Gobi, Mongolia

DIMITRI V. SEMENOV¹ AND LEO J. BORKIN²

¹*Severtzov Institute of Evolutionary Animal Morphology and Ecology, Russian Academy of Sciences, Moscow 117071, Russia*

²*Department of Herpetology, Zoological Institute, Russian Academy of Sciences, St. Petersburg 199034, Russia*

Abstract. -Przewalsky's Gecko (*Teratoscincus przewalskii*) is one of the least studied representatives of the herpetofauna of Central Asia. We present the results of a study of the habitat, demography, spatial distribution, activity, and diet of this lizard. Our observations indicate that individuals of *T. przewalskii* are active foragers that feed primarily on beetles, and are strictly nocturnal. Individuals of this species do not protect territories, but do exhibit aggressive behavior. We present a detailed analysis of home ranges over a five year period.

Key words: Reptilia, Lacertilia, Gekkonidae, *Teratoscincus przewalskii*, Gobi Desert, Mongolia, ecology.



FIG. 1. An adult *Teratoscincus przewalskii*.



FIG. 2. A juvenile *Teratoscincus przewalskii*.

Introduction

From the time it was first described, Przewalsky's Gecko (*Teratoscincus przewalskii* Strauch, 1887) has remained one of the least studied representatives of the herpetofauna of Central Asia. As distinguished from its close Central Asian relative, the Turkestan Plate-Tailed Gecko (*T. scincus* Schlegel), this species has been very rarely studied in nature, and it was only in 1961 that it was recorded in the fauna of Mongolia (Figs. 1, 2 and Plate 1). Occasional data on its biology are available (Borkin et al., 1983a, 1983b; Munkhbayar, 1976; Obst, 1962; Semenov and Borkin, 1986; Szczerbak and Golubev, 1986;

Zhao, 1985).

In the summers of 1981, 1982, and 1985, observations of this species were performed at the Ekhiyn-Gol (Ehiin-Gol) Desert Station of the Joint Soviet-Mongolian Complex Biological Expedition. In addition, material on this species was collected in other regions of the Transaltai Gobi in the course of faunal surveys. The Ekhiyn-Gol (Ehiin-Gol) Oasis is situated in the subzone of extremely arid deserts (average annual precipitation is 20-50 mm) in the south of the Bayanhongor Aymag (Province), (Fig. 3). Frosty winters with air temperatures of as low as -34°C, hot summers (air temperatures of up to 42°C

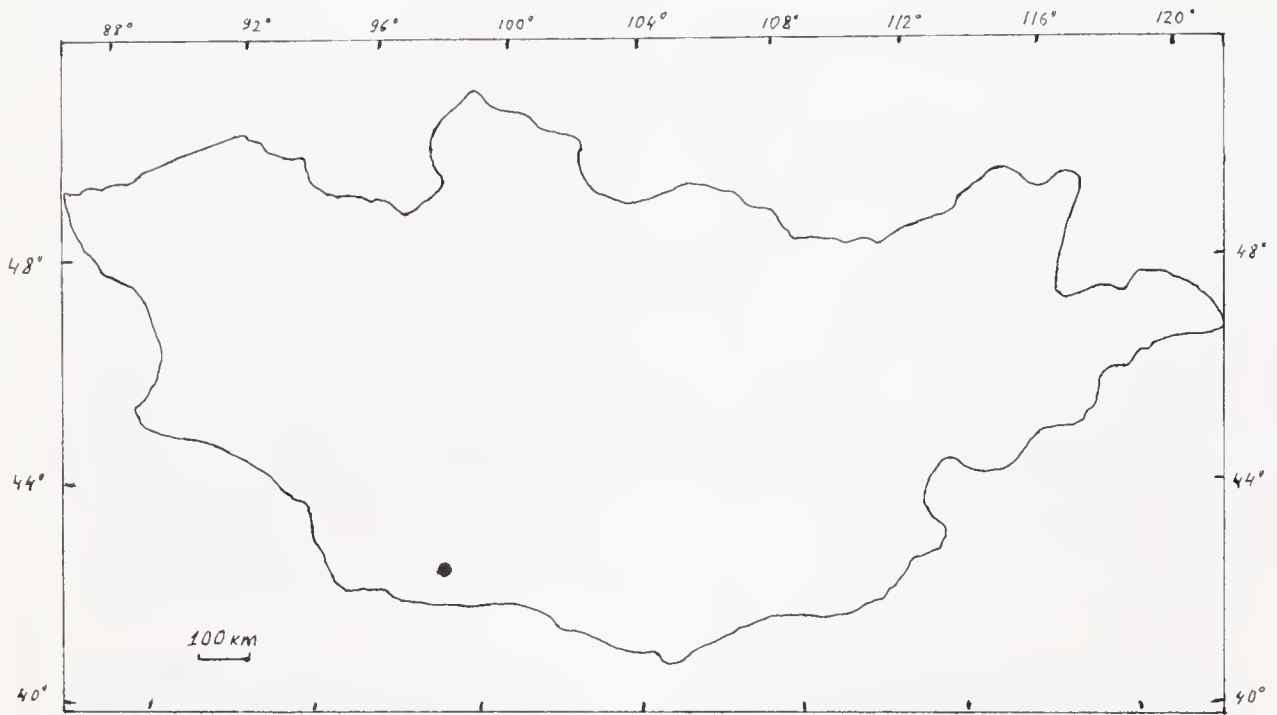


FIG. 3. The geographic position (dot) of Ekhiya-Gol Oasis, Transaltai Desert, Bayanhongor Aymag (Province), Mongolia.

and ground surface temperatures of up to 70°C), abrupt daily temperature fluctuations (up to 42°C), strong winds, and sand storms are the main features of the local climate (Figs. 4 and 5).

The most typical landscape of the Transaltai Gobi is broken stone desert plains or depressions surrounded by mountains. Vegetation in the vicinity of the Ekhiyn-Gol Oasis consists of Saxaul (*Haloxylon ammodendron*) with some *Nitraria sphaerocarpa*, *Zygophyllum xanthoxylon*, *Ephedra przewalskii*, *Calligonum mongolicum*, *Reaumuria soongorica*, and others. On the edge of the oasis there are two small sand sites with tall Saxaul trees. On one of these sites a plot was established for observation of geckos (Fig. 6). Here Przewalsky's Gecko coexists with a lacertid lizard, *Eremias vermiculata*, a colubrid snake, *Psammophis lineolatus*, and a boid snake, *Eryx tataricus*. Another lizard species, the agamid *Phrynocephalus versicolor*, was occasionally recorded in peripheral parts of the sands, near broken stone desert habitat

where this species is more common. More detailed information on the nature of the Transaltai Gobi and on the Ekhiyn-Gol Desert Station is available from the book "Deserts," edited by Sokolov and Gunin (1986).

Methods

At night, geckos are easily discernible due to a characteristic ruby reflection of their eyes in the light of an electric torch. Thus, lizards may be located from a distance of a few dozen meters. To characterize their spatial distribution, individuals were marked by paint and by toe-clipping on the first capture. On subsequent captures, the lizards were remarked with paint if necessary. White numbers painted on the back of the animals make them easily recognizable (until molting) at night in the light of a torch without much disturbance to them. This double marking scheme allows an estimate of the time interval between molts. Marking and observation were performed on a 100 by 100 m plot established on a

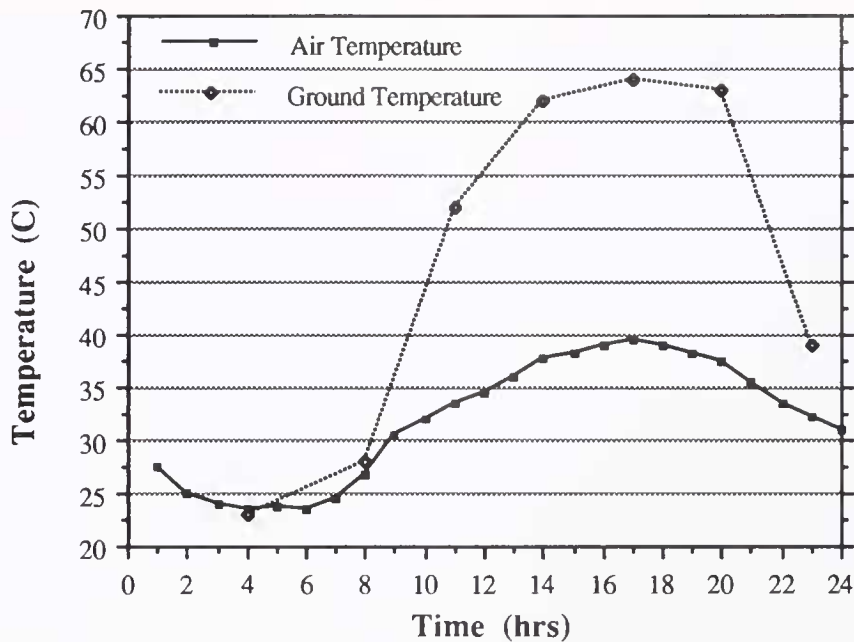


FIG. 4. Daily variation in air and ground surface temperature at Ekhiya-Gol Oasis, Transaltai Desert, Bayanhongor Aymag (Province), Mongolia, June 15, 1981, warmest day of the Summer.

sandy site with some Saxaul. Marked stakes were placed at 10 m intervals. The plot was inspected daily at various times from June 26 to August 17, 1981, from July 5 to August 13, 1982, and July 7-8, 1985. Gecko observations were recorded in relation to the stakes. In 1981 and 1982, a total of 83 geckos were marked, and 365 recaptures were recorded on the plot and near its boundaries. In fact, all individuals inhabiting the plot during this period were marked. Occasional non-marked animals appeared due to irregular invasions. The data were processed according to Semenov and Kulikova (1983) and Semenov and Borkin (1985). For each individual, the size of the home range, average and maximum movement, average radius of sightings, extent of reciprocal overlapping, and changes in range position were determined depending on the completeness of the data. Body length, tail length, and sex of captured animals were also recorded. Along with observations on this permanent plot, the population density of this species in Ekhiyn-Gol was determined by a complete removal study on August 16-23,

1981 on another plot of the same size, located on the other sand site. The absolute density with consideration of the marginal effect was estimated according to Semenov and Shenbrot (1985).

To characterize the daily and temperature dependent activities of Przewalsky's Gecko, the time of observation and air and ground temperatures were recorded. Cloacal temperatures were recorded from 45 geckos in three localities.

The stomach contents of 29 individuals caught in the vicinity of the Ekhiyn-Gol Oasis were studied. The weight of the stomach and its contents and the taxonomic identity, size, and dimensions of food items were determined, and the parameters of diet diversity were calculated according to Semenov (1986).

The behavior of geckos in their natural environment was observed in a corral 2 by 2 m, by 25 cm in height, constructed of polyethylene film. Observations were performed day and night with a red torch.

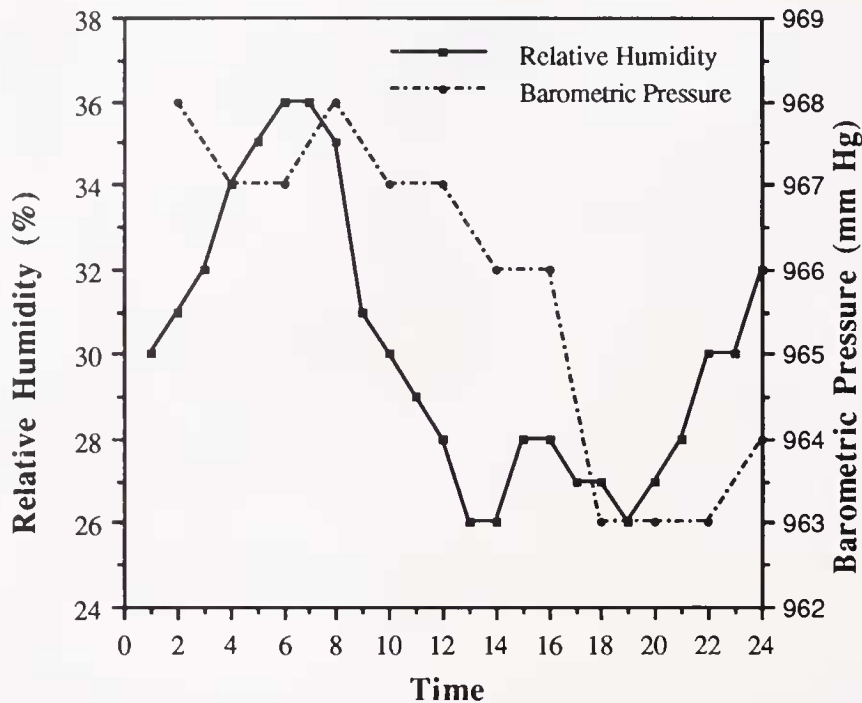


FIG. 5. Daily variation in relative humidity and barometric pressure at Ekhiya-Gol Oasis, Transaltai Desert, Bayanhongor Aymag (Province), Mongolia, June 15, 1981, warmest day of the Summer.

Results and Discussion

Habitat Preference

Unlike the stenotopic psammophilous *T. scincus* (Szczerbak and Golubev, 1986), Przewalsky's Gecko (also a predominantly psammophilous species) regularly occurs in other biotopes. It seems to depend on the relative rarity and patchiness of sandy sites in the Transaltai Gobi where broken stone deserts prevail. The commonest habitat of *T. przewalskii* in this region is semistabilized sands overgrown with Saxaul (Fig. 6). Stationary observations are performed at precisely such a place. The marking plot in 1981 was permanently inhabited by 18 individuals. A similar result was obtained on the other census plot where 19 geckos were caught. With consideration of the marginal effect, the last figure yields an estimated density of 11.5 individuals per hectare. In 1982, 12 permanent residents were recorded on the plot.

In gecko habitats, *Tamarix* sp. and *Calligonum mongolicum* may be present in

addition to Saxaul on sand, and sometimes replace it. On margins of oases, geckos occur on small sandy hills with low shrubs (*Reaumuria soongorica*, *Zygophyllum xanthoxylon*, *Ephedra przewalskii*, and rarely, *Nitraria sphaerocarpa*). It should be noted that Przewalsky's gecko was found in only part of all seemingly suitable sandy biotopes (habitats) in the Transaltai Gobi. They definitely avoid clear nonstabilized sand without vegetation.

Sometimes geckos also settle on small hills with fine soil covered by a dense surface crust, or on takyr-like sites, such as at Toli-Bulag in the vicinity of Ekhiyn-Gol or at Dzamiin-Huren-Els [southernmost Mongolia, Ömnögovii Aymag (Province)]. At the latter site, geckos were numerous under *Tamarix* sp. bushes and under *Nitraria sphaerocarpa*. Thus, on August 31, 1982, in spite of rain, 22 individuals were caught in a 1.5 hour period.

As well as on sandy biotopes, this species may be found on broken stone desert sites adjacent to sand, including hammada absolutely devoid of vegetation.



FIG. 6. A small sand hill with Saxaul Trees (*Haloxylon ammodendron*). This was a plot used for observation of *T. przewalskii*, June 22, 1981.

According to our data, *T. przewalskii* may live in areas up to 200 m distant from sand. Obviously, this enables geckos to populate isolated sandy areas scattered in the Transaltai as islands in stony regions of the desert. We note a particularly interesting situation in Bayan-Gol [Ömnögovi Aymag (Province)] where in the middle of July, geckos were found only on slopes (sometimes steep) of stony hills, and were completely absent from adjacent sands (Semenov and Shenbrot, 1986b).

Demographic Parameters

In the Ekhiyn-Gol population, adults with body lengths exceeding 70 mm are prevalent. The maximum body length of a mature gecko is 94 mm for males, and 96 mm for females. Body weight reaches 25 g. The minimum body length of individuals that have overwintered once is

51 mm. After hatching, juveniles have a minimum body length of 40 mm and a body weight of about 2 g (Fig. 7).

On the plot in 1981, 16 males, 11 females, 22 subadults, and 15 juveniles were marked. On the same plot in 1982, 13 males (12 marked the previous year), 8 females (6 marked the previous year), 15 subadults (7 marked the previous year), and 3 juveniles were recorded. Of the 12 geckos caught on the plot in 1985, 6 were marked in 1981-1982, including a male and a female marked as adults in 1981, a female marked as an adult in 1982, a male marked as a subadult in 1981, and a male and a female marked as subadults in 1982.

All subadults marked in 1981 reached the adult size by the summer of 1982, though some of them were provisionally left in the subadult group. Thus, maturity

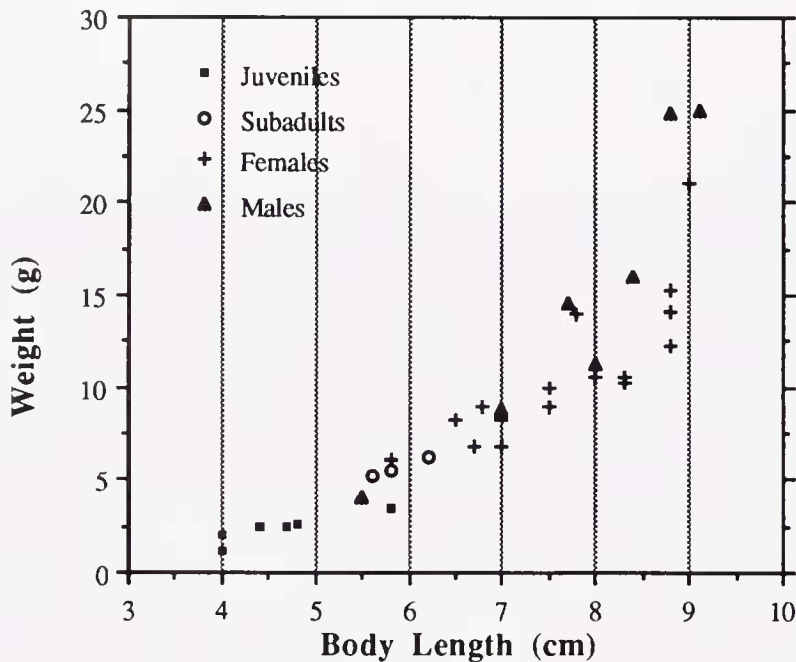


FIG. 7. The relation between body weight and body length (snout to vent) in *T. przewalskii*.

is reached after two winters. The life span of these geckos reaches 6 years in the wild. It is to be taken into consideration that the body length on a female caught in 1985 was the same as in 1981, while lizards which had overwintered twice had a body length of 78 mm. Thus, the life span may exceed 6 years.

According to our measurements of marked and recaptured geckos, juveniles grow 15-18 mm in length by the beginning of the next season. The annual growth of immature individuals fluctuates between 4 to 18 mm. Adult males grow 0-8 mm; adult females grow 0-4 mm. It should be noted that errors of measurement of body length of live lizards in the field are quite high (2-4 mm). Thus, these geckos grow rapidly during the first two years of life before maturity, then their growth slows down. The female mentioned above whose length was 90 mm in 1981 remained the same over 4 years, while a male marked in 1981, having a body length of 77 mm, was 84 mm long in 1982 and 92 mm in 1985.

Some of the prevalence of males among recorded geckos is obviously related to their larger home ranges (see below). The

approximate sex ratio in nature is close to 1:1.

Unfortunately there are no collections made in the spring and the beginning of summer, which is obviously the time of reproduction and egg laying. Spring begins in the Transaltai Gobi in March and terminates in May, and is commonly dry. Snow melts in the first half of April. The summer months last from June to the beginning of September. Commonly up to 80% of the annual precipitation (mainly rainstorms) falls during three summer months, mainly between the second half of July and the middle of August. In this region, *T. przewalskii* begin their reproduction not earlier than the second half of April, and probably later. Females caught in various places from July to August had no eggs ($N = 21$), and only small follicles up to 3 mm in diameter were present. In a female caught in May 27, 1982, 80 km southeast of Nomgon settlement [the Ömnögovi Aymag (Province)], follicles reached 5 mm in diameter. On August 26, 1982, N. L. Orlov found two eggs about 16 mm in diameter with developed embryos (see Szczerbak and Golubev, 1986). Juvenile

TABLE. 1. Spatial distribution in a population of *T. przewalskii*.

Sex/age groups, year of observations	Home range area, m ²	Average movement, m	Radius of recurrent sightings, m	Maximal movement, m
Males (1981)	1434.4±623.7	31.7±6.0	16.8±2.5	48.3±6.8
N	7	13	7	8
Males (1982)	1267.3±510.2	35.5±12.5	16.3±2.2	47.3±8.8
N	8	10	8	8
Males (1981+82)	1345.3±384.3	33.3±6.2	16.5±1.6	47.8±5.4
N	15	23	15	16
Females (1981+82)	1004.4±403.3	20.6±2.2	15.0±1.1	38.3±3.2
N	4	9	6	6
Subadults (1981-82)	312.0±61.4	19.5±3.5	10.1±1.3	35.8±5.4
N	11	21	13	12
Juveniles (1981-82)	-	14.3±4.2	-	-
N	-	4	-	-

T. przewalskii appear later than other lizard species in the same region. In 1982, the first juveniles were found in July, 1985 [July 10 in the Örgöstiyn-Us Oasis of the Gobi-Altai Aymag (Province), and July 13 in the Ekhiyn-Gol Oasis]. In 1985, the first juvenile was caught on July 18 at the Bayan-Gol area, south of the Ömnögovi Aymag (Province). However, in 1981, the first juvenile in the Ekhiyn-Gol Oasis was not found until August 4.

This leads us to believe that the period of egg laying is shorter in *T. przewalskii* than in the Middle Asian *T. scincus*, which mates in April and lays between June and July (rarely in the beginning of August) (see Szczerbak and Golubev, 1986). It is possible that Przewalsky's Gecko lays only one clutch of 1-2 eggs, as related species due. Demographic parameters characterize Przewalsky's Gecko as having a K-selection strategy (Pianka, 1981).

Spatial Distribution

Teratoscincus przewalskii do not migrate. Most individuals possess clearly delineated home ranges. Some geckos seem to be nomadic, partly explaining the disappearance of some individuals from the plot, and the appearance of new geckos. However, such translocations are rare; in spite of regular surveys in the vicinity of the plot, no marked geckos were found at distances much exceeding their normal

range of movements. The maximum recorded movement during one season is 140 m for an adult male in 1982 (it is interesting that in 1981, the same lizard moved 19.5 m, also the maximal movement of the year). On the average, movements were much lower (Table 1).

Home ranges do not differ much from year to year. The seven geckos for which home ranges were determined in 1981 had nearly identical ranges in 1982 (Figs. 8 and 9). The mean distance between the centroids of the 1981 and 1982 home ranges was 19.4 m (range: 3-36 m). Other geckos recorded in both years were found either within their 1981 home ranges in 1982, or between 1 to 58 m from the nearest point of observation in 1981. The greatest distance between points of observation in 1981 and 1982 is 180 m, by a subadult male (first marked as a juvenile after hatching in 1981). In 1985, six geckos were found from 30 to 130 m from the nearest point of observation in 1982. Thus, Przewalsky's Gecko, like the agamid lizard, *Phrynocephalus versicolor*, studied by the same method, a gradual shift of home ranges takes place (Semenov and Borkin, 1985; Smirina and Semenov, 1985).

Individual movements of geckos did not vary significantly among age/sex classes between 1981 and 1982 ($t = 0.27$, $N = 23$, $P > 0.05$). The size of home ranges and

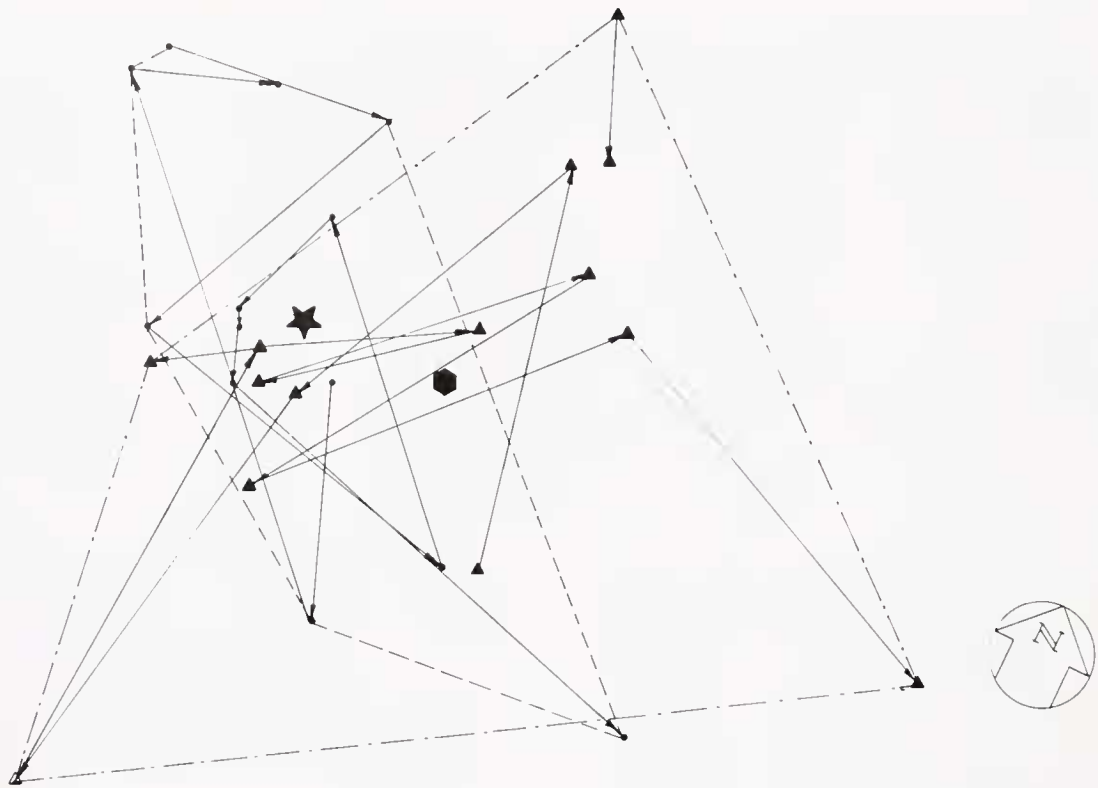


FIG 8. The movements of an adult female *T. przewalskii*. Dot: records of the lizard in 1981. Triangle: records of the lizard in 1982. Star: centroid of the 1981 records. Hexagon: centroid of the 1982 records. Solid arrow: denotes the next closest sighting in time. Dashed line: arbitrary boundary of the 1981 individual range. Dot-dash line: arbitrary boundary of the 1982 individual range.

other parameters (the combined data for both seasons) are higher in males than in females (Table 1), but in no case is the difference at a significant level (home range: $t = 0.61$, $N = 19$, $P > 0.05$; individual movements: $t = 1.92$, $N = 32$, $P > 0.05$; radius of recurrent sightings: $t = 0.77$, $N = 21$, $P > 0.05$; maximum movements: $t = 1.51$, $N = 22$, $P > 0.05$). However, the home range area and the radius of recurrent sightings is significantly greater in males than in subadults (home range: $t = 2.66$, $N = 26$, $P < 0.05$; recurrent sightings: $t = 3.12$, $N = 28$, $P < 0.01$).

The home ranges of these geckos overlap greatly (Fig. 7), irrespective of sex. Obviously Przewalsky's Geckos are not territorial. Their spatial distribution corresponds to the scheme typical lizards actively looking for their prey, living in

conditions of relatively poor visibility, and widely exploiting nonvisual orientation methods (Stamps, 1977).

Special attention should be given to the movement of marked juveniles. Unlike adults (see above), only 2 of 15 juveniles marked in 1981 were recorded in the next year (one of them was at a distance of 180 m; another had formed a home range 23 m from the marking point). Altogether, 18 juveniles were marked, of which 14 were not encountered during the same year, and 4 occurred twice each. It may be assumed that in Przewalsky's Gecko, juveniles are in the dispersal mode, similar to the agamid, *Phrynocephalus versicolor* (Semenov and Borkin, 1985). Having hatched, juveniles do not form home ranges, but disperse and only settle after the first overwintering. Movements of juveniles may exceed the maximum

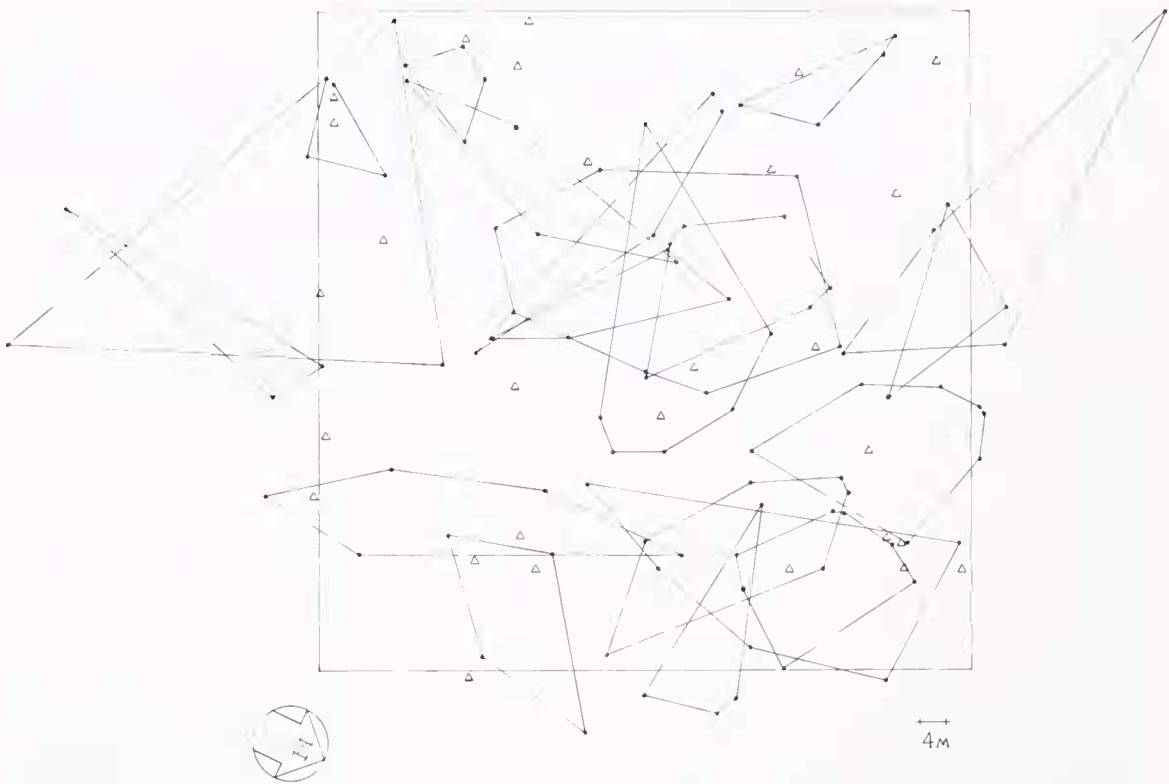


FIG. 9. Individual ranges of the gecko, *T. przewalskii* in 1981. Open triangle: records of lizards captured only once. Solid line: arbitrary boundary of individual ranges.

movements of adults (see above).

Shelter

Przewalsky's Geckos use their own burrows and those of rodents as shelters. Gecko burrows are, as a rule, made at the base of bushes, with a semicircular opening. The length of the burrow is a few dozen centimeters.

Activity and Temperature

Przewalsky's Gecko is exclusively nocturnal. This is its distinction from many other "nocturnal" representatives of the Gekkonidae, which are characterized by mixed or crepuscular activities (Szczerbak and Golubev, 1986). According to Obst (1963), in the Galbyn-Gobi, in the first 10 days of September, geckos were active between 20:00 and 24:00 hours. We observed active individuals from 21:50 to 04:00 hours, at air temperatures of 16-29.5 °C and ground temperatures of 18-29 °C.

Strong wind and drizzling rain do not decrease the activity of geckos noticeably. Distinct periods of increased and decreased activity are evident at different times not clearly related to any weather conditions. Such periods are not restricted to post-sunset hours, as in some other gecko species (Pianka and Pianka, 1976; Cooper et al., 1985). This ecological aspect of this species requires special study.

The cloacal temperature in 45 geckos measured from 22:00 to 23:30 hours at three different localities ranged from 17.5 to 28.5 °C. Figure 10 demonstrates the relationship of cloacal temperature to air temperature in 25 individuals of different age and sex [in the vicinity of Ekhiyn-Gol and Shara-Hulsny-Bulag oasis in the south of Bayanhongor Aymag (Province)]. As a rule, cloacal temperature is slightly lower than air temperature by about 1°C. In only six individuals was cloacal temperature higher than air temperature. This may have been the result of stress since these lizards

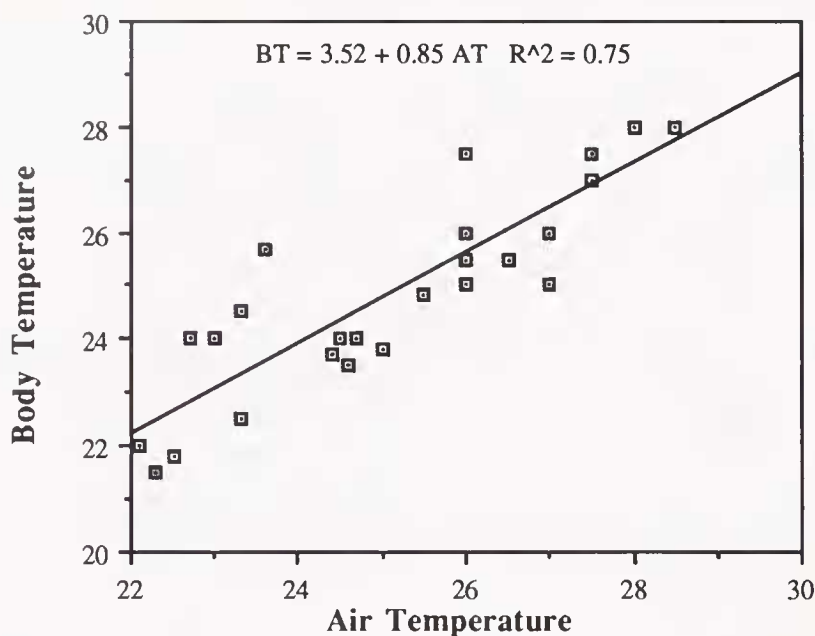


FIG. 10. The relation between air and cloacal temperatures in *T. przewalskii*.

were either being pursued or handled for a long time. During a few minutes of handling, the cloacal temperature in a gecko may increase by 3-4°C. Figure 11 shows the temperatures of 11 geckos from the vicinity of the Shara-Hulsny-Bulak Oasis. Measurements were made on July 5, 1982, during a strong wind. The sand temperature was slightly higher than the air temperature. The temperature of the back of the lizards slightly exceeded the cloacal temperature. In 20 individuals caught in the Dzamiin-Huren-Els area in late summer (August 31, 1982), the cloacal temperature was 17.5-19.8°C, averaging 18.3°C, with an air temperature of 18.0-18.2°C. The temperature of the sand surface was 18°C, and the temperature of the ground air layer dropped from 17.5 to 16.2°C during the 22:00-23:20 hour measurement period. It should be noted that lizards were caught and measurements made during a weak rain.

On the whole, the above data are too scanty and diverse to make any final conclusions on the thermobiology of Przewalsky's Gecko.

The strictly nocturnal activities of this species seem to be controlled by a light

factor of by the combined action of light and temperature, rather than by temperature alone. In any case, suitable temperatures occur not only at night, but also in the evening and morning (Fig. 4), but geckos were never met during the light of day.

Diet

Analysis of the stomach contents of Przewalsky's Gecko (Table 2) demonstrates that, like the Middle Asian *T. scincus*, (Bannikov et al., 1977) this species feeds mainly on beetles. Specialization in feeding on beetles manifests itself in the development of a robust jaw apparatus. Relatively low diversity parameters of feeding are the consequence of this specialization (Table 3). Similar values are only known for some populations of the agamid lizard, *Phrynocephalus versicolor* feeding mainly on ants. They are much higher in other lizards of the Transaltai Gobi (Semenov, 1986). The largest food items are the tenebrionid darkling beetles (18x6 mm), and their larvae (24x4 mm) [these are so large that only one beetle or one larva is consumed at a time]; the smallest are ants (1x3 mm). Sometimes geckos may devour larger objects. A gecko consumed an adult

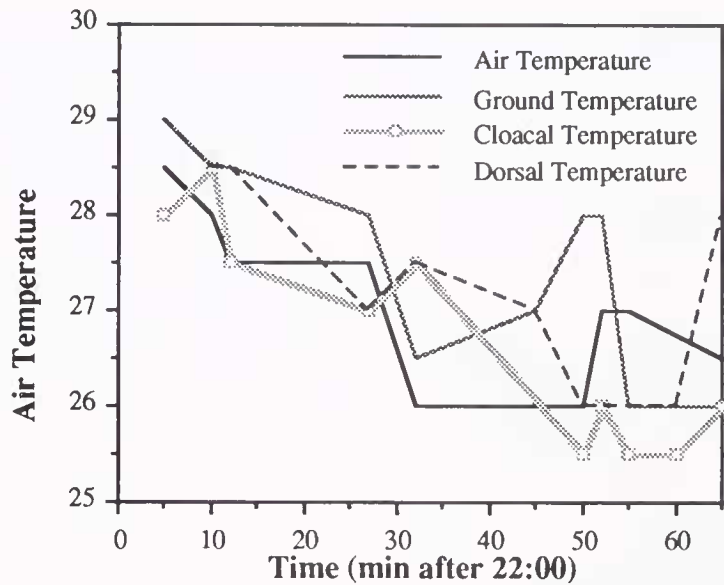


FIG. 11. Environmental and body temperatures in *T. przewalskii* versus time.

lizard, *Phrynocephalus versicolor* (about 80 mm in length, including the tail, and 10 mm in width) placed in the same bag with it. According to the observations of Szczerbak and Golubev (1986), these geckos will attack small lizards in a terrarium. The average weight of a full stomach reaches 7.8% of body weight.

Molting

Prolonged observations of marked lizards helps to record the frequency of molting (Semenov and Shenbrot, 1986a). Approximately half of the geckos observed in 1981 and 1982 molted during the period of observation. Only one individual (a subadult male) made two molts during one season: one in the middle of July and one in the middle of August, 1981. As all molted geckos were supplied with dorsal numbers again, and since in the next year these individuals were once again without numbers, it may be stated that molting takes place more than once a year. According to our data, there are no special molting periods, since molting individuals were observed throughout our observation period. Like other geckos, Przewalsky's Gecko devours the shed skin layers (found in two stomachs). According to observations in a terrarium, molting occurs

quite rapidly over the period of several hours (Obst, 1963).

Teratoscincus scincus molts not less than three times during the season. According to observations in captivity, molting takes 5-6 days (Szczerbak and Golubev, 1986).

Behavior

As was noted above, Przewalsky's Geckos do not protect territories. Nevertheless, in the corral, distinct aggressive behavior was observed: an adult darted at an approaching young gecko and inflicted a powerful blow to its head (perhaps having bitten it); one of them emitted a short acoustic signal. Przewalsky's Geckos have no permanent "observation posts" on the home range, and seemingly do not protect either the range or their shelters. Such protection is known for most of the Gekkonidae (Stamps, 1977). The aggressive behavior must be related to the support of the individual distance (Carpenter, 1965).

Judging by its movements, Przewalsky's Gecko is a typical predator that actively forages for its prey, in contrast to most other geckos that mainly wait for prey (Stamps, 1977). It is interesting to

TABLE. 2. Stomach contents of *T. przewalskii* (N=14).

Food items	Portion of total amount of food items (%)	Portion of total volume of food items (%)	Portion of stomachs with given food items (%)
Aranei	1.2	2.2	14.3
Solifugae	0.6	1.3	7.1
Hemiptera	8.1	3.1	57.1
Cydniidae	7.0	2.8	57.1
indet.	1.2	0.3	14.3
Neuroptera	2.9	7.4	28.6
Myrmeleonidae	2.3	3.9	28.6
larvae	0.6	3.5	7.1
Coleoptera	83.1	84.6	100.0
Tenebrionidae	80.2	80.5	100.0
larvae	0.6	2.6	7.1
Curculionidae	0.6	0.3	7.1
Chrysomelidae larvae	0.6	0.3	7.1
indet.	1.2	0.9	7.1
Hymenoptera	4.1	1.4	28.6
Formicidae	1.2	1.1	14.3
Mutilidae	0.6	0.1	7.1
Parasitica	0.6	0.3	7.1
indet.	1.7	0.2	14.3

TABLE. 3. Diet diversity of *T. przewalskii*.

Diversity parameters (width of the feeding niche-B)	Food groups (families)	Food groups (orders)
Volume of food items	1.295	0.923
Amount of food items	1.329	0.968

B is calculated according to Colwell and Futuyma (1971).

note that according to our observations in the corral, geckos often touch the ground surface with their tongue. Such chemoreceptive behavior is common in the Lacertidae and the Scincidae (Stamps, 1977), and is noted in some agamids (Panov and Zykova, 1986; Semenov, 1985). In contrast to *T. scincus*, Przewalsky's Geckos can swiftly and easily climb bushes, and do it rather often in escaping the pursuit. Geckos may climb bushes up to the height of 80 cm. In the corral, burrowing of a gecko was observed. Only its forelegs participated. Acoustic signaling is not noted in natural conditions, but handled geckos sometimes emit a brief squeak. Similar to the Middle Asian *T. scincus*, the autotomized tail emits a rather loud rustling, and wriggles for a long time (up to 19 minutes). The skin of these geckos is fragile, thus helping them to "slip out" if taken in hand. When handled, they desperately twist and try to bite.

The alarmed gecko rises in its straightened legs and lifts up its short, fleshy tail. In this posture, the gecko is somewhat similar to a dog. Evidently for this reason it is called in Mongolia, "Nokhoy-Gurvel," meaning, "a dog lizard."

Acknowledgments

We would like to express our gratitude to our Soviet and Mongolian colleagues, H. Munkhtogoo, N. L. Orlov, and H. Terbish for their cooperation in field work. We greatly appreciate G. I. Shenbrot's help in processing the data, and V. B. Beyko's advice on identification of food items. Kh. Munkhbayar consulted and supplied us with the photo of an adult gecko. T. J. Papenfuss, J. R. Macey and K. Autumn kindly corrected our manuscript. Our research was funded by the USSR Academy of Sciences.

Literature Cited

- BANNIKOV, A. G., I. S. DAREVSKY, V. G. ISHCENKO, A. K. RUSTAMOV, AND N. N. SZCZERBAK. 1977. [Guide to the amphibians and reptiles of the USSR fauna]. Prosveshchenie, Moscow. 414 pp. (In Russian).
- BORKIN, L. J., KH. MUNKHBAYAR, AND D. V. SEMENOV. 1983a. [Amphibians and reptiles]. Pp. 52-56. In [Complex characteristics of desert ecosystems of the Transaltai Gobi]. Pushchino. (In Russian).
- BORKIN, L. J., KH. MUNKHBAYAR, AND D. V. SEMENOV. 1983b. [Amphibians and reptiles of the Transaltai Gobi]. Priroda, Moscow 10:68-75. (In Russian).
- CARPENTER, C. C. 1965. Aggression and social structure in iguanid lizards. Pp. 87-105. In W. W. Milstead (ed.), Lizard ecology: a symposium. University of Missouri Press, Columbia, Missouri.
- COOPER, W. E. JR., C. CAFFREY, AND L. J. VITT. 1985. Diel activity patterns in the banded gecko, *Coleonyx variegatus*. Journal of Herpetology 19(2):308-311.
- COWELL, R. K., AND D. J. FUTUYMA. 1971. On the measurement of niche breadth and overlap. Ecology 52(4):567-576.
- MUNKHBAYAR, H. 1976. [Amphibians and reptiles of the Mongolian People's Republic]. Ulaanbaatar. 167 pp. (In Mongolian).
- OBST, F. J. 1962. Eine herpetologische Sammelreise nach der Mongolei. Aquarien-Terrarien, GDR 9(11):333-342.
- OBST, F. J. 1963. Amphibien und Reptilien aus der Mongolei. Mitteilungen aus dem Zoologischen Museum in Berlin 33(2):361-370.
- PANOV, E. N., AND L. Y. ZYKOVA. 1986. [Notes on the *Agama sanguinolenta* behaviour. 2. Everyday and communicative behaviour]. Zool. Zhurnal, Moscow 65(2):234-246. (In Russian with English summary).
- PIANKA, E. R. 1978 (1981). Evolutionary ecology, 2nd edition. Harper and Row, New York. (Reference in this article is made from the Russian edition 1981. Mir, Moscow, 399 pp.).
- PIANKA, E. R., AND H. D. PIANKA. 1976. Comparative ecology of twelve species of nocturnal lizards (Gekkonidae) in the western Australian desert. Copeia 1976(1):125-142.
- SEMENOV, D. V. 1985. [The behaviour of *Phrynocephalus versicolor*. Zool. Zhurnal, Moscow 64(10):1545-1555. (In Russian with English summary).
- SEMENOV, D. V. 1986. [Feeding of the motley round-headed lizard, *Phrynocephalus versicolor* (Reptilia, Agamidae) in southern Mongolia]. Bulletin of the Moscow Society of Naturalists, series biology 91(6):16-29. (In Russian with English summary).
- SEMENOV, D. V., AND L. J. BORKIN. 1985. [Movements and individual ranges in *Phrynocephalus versicolor* (Reptilia, Agamidae) in the Transaltai Gobi, Mongolia]. Zool. Zhurnal, Moscow 64(2):252-263. (In Russian with English summary).
- SEMENOV, D. V., AND L. J. BORKIN. 1986. [Amphibians and reptiles]. Pp. 114-119. In V. E. Sokolov and P. D. Gunin (eds.), [The deserts of the Transaltai Gobi. The natural features, ecosystems, and regionalization]. Nauka, Moscow. (In Russian).
- SEMENOV, D. V., AND G. S. KULIKOVA. 1983. [Home ranges and movements of *Phrynocephalus interscapularis* (Reptilia, Agamidae)]. Zool. Zhurnal, Moscow 62(8):1209-1220. (In Russian with English summary).
- SEMENOV, D. V., AND G. I. SHENBROT. 1985. [An estimate of absolute density of lizard populations taking into account the marginal effect]. Zool. Zhurnal, Moscow 64(8):1246-1253. (In Russian with English summary).
- SEMENOV, D. V., AND G. I. SHENBROT. 1986a. [Data on molting in lizards of the genus *Phrynocephalus*]. Ekologiya, Sverdlovsk 2:80-82. (In Russian).
- SEMENOV, D. V., AND G. I. SHENBROT. 1986b. [Data on herpetofauna of southeastern Mongolia]. Pp. 110-119. In E. I. Vorobyeva (ed.), [Herpetological investigations in Mongolian People's Republic]. Moscow. (In Russian with German summary).
- SMIRINA, E. M., AND D. V. SEMENOV. 1985.

- [New data on movements of *Phrynocephalus versicolor* (Reptilia, Agamidae)]. Zool. Zhurnal, Moscow 64(8):1272-1274. (In Russian with English summary).
- SOKOLOV, V. E., AND P. D. GUNIN (eds.). 1986. [The deserts of the Transaltai Gobi. The natural features, ecosystems, and regionalization]. Nauka, Moscow. 207 pp. (In Russian).
- STAMPS, J. A. 1977. Social behavior and spacing patterns in lizards. Pp. 265-321. In C. Gans and D. W. Tinkle (eds.), Biology of the Reptilia, Vol. 7, Ecology and Behaviour A. Academic Press, New York.
- SZCZERBAK, N. N., AND M. L. GOLUBEV. 1986. [Geckos of faunas of the USSR and adjacent countries]. Naukova Dumka, Kiev. 232 pp. (In Russian).
- ZHAO, K. 1985. [An investigation on the lizards of Xinjiang Uygur Autonomous Region]. Acta Herpetologica Sinica 1985-4(1):25-29. (In Chinese with English summary).